

OUTLINE SHEET 4-1-1

Tools

A. Introduction

Using the right tool for the right job is a big boost in efficiency and safety. As a shipboard engineer, knowing when and which tools to use is a must. This lesson will familiarize you with the tools that are commonly used in the machinery spaces.

B. Enabling Objectives

- 4.1 **IDENTIFY** the use of tools used in engineering spaces.
- 4.2 **STATE** the safety precautions used when working with power tools.
- 4.3 **DESCRIBE** the types of tool control.
- 4.4 **DESCRIBE** the safety precautions in the vicinity of heavy weight and suspended loads.

C. Topic Outline

- 1. Introduction
- 2. Overview
- 3. Review of Common Hand Tools
- 4. Wrenches
- 5. Special Purpose Tools
- 6. Pneumatic Tools
- 7. Electrical Power Tools
- 8. Lifting Tools
- 9. Tools Control
- 10. Summary and Review
- 11. Assignment

ASSIGNMENT SHEET 4-1-2

Tools

A. Introduction

This material is to be completed prior to the material being covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 4-1-1.

C. Study Assignment

1. Read Information Sheet 4-1-3

D. Study Questions

1. What is a torque wrench used for?
2. What measuring tool is used to measure spark plug gaps?
3. What tool is used to cut external threads?
4. What safety equipment is required when using electrically powered tools?

INFORMATION SHEET 4-1-3

Tools

A. Introduction

This information describes tools.

B. Reference

Use and Care of Hand Tools and Measuring Tools NAVEDTRA 12085
Basic Military Requirements NAVEDTRA 12043

C. Information

- I. The maintenance person must have, and use, the correct tools in order to do the work quickly, accurately, and safely.
 - A. Without the proper tools or knowledge to use them, the maintenance person wastes time, reduces efficiency, and may face injury.
 - B. No matter how small the job, safety must be practiced at all times. A tool may be efficient, essential, time saving, or even convenient, but it is also dangerous.
 - C. A tool must be used correctly and only for the job for which it was designed.
- II. The user must always be alert for any conditions that may endanger him/her self or fellow workers.
 - A. Always wear personal protective equipment whenever required.
 - B. Always follow safety guidelines. Remember, **you** are the most valuable tool.
- III. Review of common hand tools - Most people are familiar with and have used most common hand tools, therefore, common hand tools will not be covered in this trainee guide. If you need a review of common hand tools and their uses, consult with your instructor, or the training manual NAVEDTRA 12085, Use and Care of Hand Tools and Measuring Tools.
- IV. In addition to the ordinary tools, engineers must also get familiar with and learn how to use various special tools.
 - A. Socket wrenches
 1. Consists of a round metal sleeve with a square opening in one end for insertion of a handle, and a 6-point or a 12-point wrench opening in the other.
 2. The 6-point socket wrench is used with impact wrenches or where the possibility of rounding of the nut or bolt head exists. It is not suitable for turning square nuts.
 3. Both the 6-point and the 12-point sockets are available in both common (short) and deep (long) lengths.
 4. The square or drive end may vary in size from 1/4 to 1 inch.

5. Socket wrenches are turned by ratchet handles, speed handles, sliding T-bar handles, and hinged handles.
- B. Strap wrench
 1. Is used to connect or break pipe joints or to turn cylindrical parts.
 2. It has a canvass or leather strap so as not to mar the surface of the pipe or shaft.
- C. Slugging wrench
 1. This is used when large metal fasteners are encountered and ordinary manual tightening or loosening will not suffice, i.e., foundation bolts, boiler handhole plugs, and boiler manhole covers.
 2. It has a handle suitable for being hit with a hammer.
 - a) A sledge hammer is used to deliver the heavy blows.
- D. Torque wrench
 1. It is used to measure the degree of tightness of nuts and bolts.
 2. It reads in either foot-pounds (FT-LBS) or inch-pound (IN-LBS)
 3. Torque wrenches are precision equipment and have to be periodically tested or calibrated for accuracy.
- E. Spanner wrenches are normally used to tighten or loosen fire hoses or devices with similar couplings.
 1. Hooked spanner wrenches are either fixed or adjustable
 2. Pin-type have pins that fit into holes in the coupling or plate to be tightened or loosened.
 3. Pin faced type spanner wrenches are used to remove protective cover plates.
- F. Mechanical fingers are used to retrieve small articles that have fallen into places where they cannot be reached by hand.
- G. Inspection mirrors aid in making detailed inspections of areas that cannot be directly seen.
- H. Calipers are used to measure the diameter or thickness of an object.
 1. are designed to measure either inside or outside diameters
 2. are used along with machinist rule to find the measurement
- I. Wire twister pliers are three-way pliers that hold, twist, and cut.
 1. They are designed for twisting safety wire on nuts and bolts.
 2. They can also be used to install flange shields.
- J. Gasket cutters are used to cut circular gaskets from rubber, leather, paper, and asbestos sheets.
 1. Bench top models cut holes from 1" to 20" using a pivot point and knives.
 2. Small holes are made using a hollow gasket punch. A hardwood block is used with it to prevent dulling of the cutter. The hollow gasket cutter is struck with a hammer.

- K. Thickness or feeler gage is used to check or measure small openings such as contact points and narrow slots.
 - 1. Usually comes with 2 to 26 blades graduated into the thousandths of an inch.
- L. Dial Indicators are used to precisely align machinery components such as the pump end with the turbine end.
 - 1. It is also used to set up the work on a lathe.
 - 2. It is also used for PMS to check the axial "play" of a shaft. This is called checking for thrust, an indication of thrust bearing wear.
- M. Tube bender is used to bend tubes to desired shapes without crimping the tubing.
- N. Tube flaring tool is used to flare the ends of soft tubing.
 - 1. The tool clamps the tubing into place and puts a 45 degree flare on the end of the tube.
 - 2. Flare fittings are used to provide safe and strong dependable fittings without the necessity of threading, welding, or soldering the tubing.
- O. Bearing (or gear) puller is used to pull gears, bearings, pinions, sheaves, pulleys, and wheels from shafts.
- P. Packing extractors are used to remove packing from stuffing boxes on pumps and valves. The steel shaft has a corkscrew bit with a fine point.
- Q. Taps and dies are used to cut threads into metal or plastics.
 - 1. Taps are used for cutting internal threads.
 - 2. Dies are used for cutting external threads
- R. Screw extractors are used to remove broken screw, bolts, and studs.
 - 1. A hole is first drilled into the broken screw, then the extractor is inserted into the hole.
 - 2. The broken screw is then removed by turning the extractor counterclockwise.
- V. Pneumatic (or air-operated) tools used the ship's service low pressure air system for their operation.
 - A. As with any pressurized systems, safety guidelines must be followed when working with compressed air.
 - 1. use only the required pressure
 - 2. wear eye and hearing protection
 - 3. compressed air should not be used to dust off clothing or parts of the body
 - B. The following are examples of pneumatic tools:
 - 1. Portable pneumatic scalers are used to clean weld seams, remove paint and rust, and dress concrete and masonry
 - 2. Impact wrench is used mainly to facilitate removal or installation of a large quantity of nuts or bolts, such as in boiler casing panels.

3. Pneumatic drill is simply an air powered drill.
 4. Portable grinders usually come equipped with a grinding wheel that may be replaced by a rotary wheel wire brush or a rotary cup wire brush.
- VI. Electrical power tools most commonly used in engineering spaces are:
- A. Portable electric disk sander
 - B. Drills
 - C. Scaling and chipping tools
 1. They are used for removing rust, scale, paint, and other hard deposits from steel and other hard surfaces.
- VII. Power tools are convenient and efficient but are also inherently dangerous. To reduce the chances of serious injuries, the following safety guidelines must be observed:
- A. Always use proper eye and hearing protection when using power tools.
 - B. Ensure that electrical tools are inspected at Electrical Tool Issue by a qualified electrician before use.
 - C. Always give your full attention to your job.
 - D. Inspect the tool before using. If in doubt about the condition of any power tool, notify and show it to your supervisor.
 - E. Metal-cased electrical tools must have a three-prong plug on the power cord.
 - F. Do not operate power tools in areas where flammable vapors, gases, liquids, or exposed explosives are present.
 - G. Before plugging in a power tool, ensure its switch is in off position.
 - H. Completely familiarize yourself with the tool's controls and features before operation.
- VIII. When performing maintenance, you may have to move or lift some of the heavy equipment or components. The most commonly used lifting devices used in engineering spaces are:
- A. Chain hoists - permits small movements and gentle handling of loads. Chain hoists can be either hand operated or motor operated.
 - B. Hand operated ratchet lever hoist - similar to chain hoists but uses a ratchet handle to move the load instead of a chain.
 - C. Cranes - used when heavy equipment must be moved to pierside facility. Ship's personnel generally moves any load to the ship's main deck where it is then off loaded to the pier by the crane operator.
 - D. Jacks - allows for pushing, pulling, lifting, pressing, bending, spreading, and clamping operations.
- IX. The following are safety precautions must be followed when using lifting devices or when working in the vicinity of heavy weights or suspended loads:
- A. Use prescribed personal protective equipment such as safety shoes and hard hats.
 - B. Always know where the cargo is during a transfer.

- C. Do not exceed load rating of the lifting device and accessories such as cables, chains, hooks, and cleats. The hooks on the chain hoist will show the first sign of failing.
- D. Never allow cargo to swing or remain suspended for longer than necessary.
- E. Restrict traffic around the area where suspended loads are being handled.
- F. Do not work under suspended loads. Rope off the area and place warning signs to alert others of the hazard.
- G. Do not hang or ride on suspended loads
- H. Use positive stops before working with jacked up or pried heavy loads.
- I. Never use damaged lifting devices and accessories.
- X. Control of tools is accomplished mainly through proper storage.
 - A. Electrical tools are issued and maintained in electrical tool issue.
- XI. Different ships have their own policy regarding handling of hand tools. The following are helpful hints for the care and control of the tools you are responsible for:
 - A. Use each tool only for the job for which it was designed.
 - B. Keep each tool in its proper storage place.
 - C. Keep your tools within easy reach and where they will not fall on personnel or become lost in the bilges.
 - D. Return all broken tools to your workcenter supervisor.
- XII. A worker's efficiency is often a direct result of the condition of the tools used. Workers are judged by the manner in which they handle and care for their tools. You should care for hand tools the same way you care for your personal property.